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**BALLISTIC MISSILE DEFENSE
ORGANIZATION**

TECHNOLOGY TRANSITION PROGRAM



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ANNEX D

Section 4224, Public Law 102-484, October 23, 1992

This Annex responds to the above statute. It describes the Ballistic Missile Defense Organization's activities to promote and achieve the transitioning of technology.

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PREFACE

The following Annex discusses a unique technology transition program in one of the Department of Defense's separate operating organizations — the Ballistic Missile Defense Organization (BMDO).

BMDO is not a laboratory, nor does it direct any Department of Defense Laboratories. It does, however, use many of the Federal Laboratories, including those in the Department of Defense, in the pursuit of designing and developing a missile defense system. Because it uses all the Department of Defense Services and many of its agencies as technology agents in its defense mission, BMDO has a unique position in the transition of technology from the Defense and other Federal Laboratories.

The BMDO technology transition program is also one of the most active and innovative of any Federal technology transition program. The following Annex will describe the BMDO technology transition program through, not only Defense Laboratories, but also the other Federal Laboratories and research organizations in the BMDO research team. It will also briefly document the types of success stories that a pro-active Federal technology transition program can anticipate when applied as we believe the Congress intended. Data included in this Annex is correct as of October 1993.

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The Ballistic Missile Defense Organization's TECHNOLOGY TRANSFER ACTIVITIES

The Ballistic Missile Defense Organization (BMDO), formerly known as the Strategic Defense Initiative Organization (SDIO), has been at the forefront in developing new innovative technologies. Advances in laser research, materials, and superconductivity are just a few of the many technical breakthroughs that the program, through association and cooperation with Department of Defense (DOD) laboratories, has introduced to the nation's strong defense capabilities.

To enhance its mission, BMDO has also been a national leader in technology transfer; its Office of Technology Applications is a model program with 8 years of success in moving BMD technology out of the DOD and other Federal laboratories and into the commercial marketplace and other agencies. BMDO established a proactive technology transfer program with one goal in mind: to help enhance national economic competitiveness on a global scale, while providing matchless technology for the United States.

To meet and exceed this goal, BMDO has worked closely with government, universities, and industry to move advanced technologies to industry and other Federal applications and to develop new products and technologies. And as a result, the nation has benefited from BMD technology, which has:

- ✓ Created jobs and expanded the business base of American companies both large and small;
- ✓ Made the nation more competitive in the international arena; and
- ✓ Contributed to breakthroughs and advances in many technology areas such as biomedicine, electronics, energy, and environmental technologies.

which is part of the Office of Innovative Science and Technology (IS&T). This program is applied to all BMD research and development. Activities in this program focus on using a multichannel, multifaceted strategy to move and track technology that is transferred from BMDO to the commercial marketplace, or to other Federal, state, or local agencies. Research and development may be integrated into all activities of the Technology Applications program to fully cover commercialization possibilities, whether for a BMD contractor attempting to commercialize BMDO technology, or for an outside business seeking a technology. Activities in this program include the following:

The Technology Applications Information System (TAIS). The Technology Applications program provides abstracts of BMD technologies on-line through the Technology Applications Information System (TAIS) database. The TAIS describes commercial opportunities resulting from DOD laboratory and industry research conducted by the Innovative Science and Technology (IS&T) program, the Small Business Innovation Research (SBIR) program, the Manufacturing Operations Development and Integration Laboratories (MODILs), and other BMD-funded work. The TAIS now has over 2,000 abstracts of BMD-funded U.S. and Allied developed technologies and is continually updated and expanded to cover new developments. This database is a free service open to American corporations, government agencies, and U.S. citizens, 7 days a week, 24 hours a day. Over 23,000 individuals, businesses, and industries in the United States currently have access to the TAIS.

In 1991, BMDO and the Air Force's National AeroSpace Plane (NASP) Joint Program Office signed a Memorandum of Agreement (MOA) that outlined their commitment to cooperate in technology transfer. This MOA was especially significant because BMDO (then SDIO) originally provided funding to the NASP program. As a first step, NASP technologies were incorporated into the TAIS. NASP technology projects were integrated into the TAIS structure, and special NASP-unique shells were designed and programmed into the TAIS to meet NASP objectives in technology transfer. For instance, the NASP uses a network of advisors, who are Air Force Reservists that, as part of their Reserve duties, promote technology transfer for the NASP program. These advisors were given a special subsection in the TAIS that permitted them to access and review significantly more technical detail than available to TAIS users from U.S. industry.

BMD Technology Applications Update. The *BMD Technology Applications Update (Update)* (previously called the *SDI High Technology Update*) is an 12-page newsletter with articles about BMD spinoff technologies. As of August 1993, nine issues of this publication were circulated, featuring 82 stories and 132 technologies available for commercialization.

information on any technology mentioned in the **Update** by contacting the Technology Applications office, which in turn, releases contact information on the principal investigators involved in the technologies. In 1992, the Technology Applications program received about 5,900 requests about articles from the **Update**.

Success Stories of the Technology Applications Program: The Update

In late 1992, the Program conducted an **Update** readership survey to identify the needs of the targeted audience and the impact of the newsletter (i.e. technical depth of articles, areas of interest, results of contacting researchers of technologies mentioned in the newsletter). The Program received over 1,000 responses to the survey in 2 months. Many readers reported that contacts from the newsletter resulted in joint ventures, contracts, investments, licenses and product purchases. When asked if contacts ever resulted in business arrangements, examples of quoted responses included the following:

- "Collaboration," Baylor Research Institute;
- "Concept development," Creative Consulting;
- "Contract," Microcirc Associates;
- "Indirectly, other CRDAs — I work USASSDC tech transfer, two CRDAs on DCDS and currently working three more CRDAs," Teledyne Brown Engineering;
- "Product purchase," C&H Hydraulics and Engineering; and
- "R&D project," Murphy Industries.

Articles also helped BMD-funded researchers who's technologies were mentioned in the **Update**. A typical response was exemplified in a letter from James Cooper, Jr., a researcher from Purdue University (LaFayette, IN) whose technology for silicon carbide nonvolatile random access memories (RAMs) was mentioned in an article and resulted in 41 requests for further information. Half of these responses were from corporate executives.

An **Update** article about software mentioned research conducted by AbTech Corporation (Charlottesville, VA.). AbTech found the exposure to be extremely valuable to their extensive growth and consequently placed the **Update** article in a milestone chart plotting the corporation's commercial success.

Technology Applications Reviews. Using a forum approach to help commercialize BMD technologies, Technology Applications (TA) Reviews have introduced the intricacies of the commercial marketplace to over 200 researchers since 1989.

obtain constructive input from reviewers — experts in the commercialization process who have usually been involved in activities such as intellectual property and licensing consideration, government or commercial R&D, consortia, or public/private partnerships.

TA Reviews are generally held bimonthly and are broken down by topic. Topics currently include:

- Biomedical Technology
- Electronics
- Materials
- Optics
- Power
- Sensors
- Superconductivity

The Technology Applications program is working with the Air Force's Phillips Laboratory (Albuquerque, NM) on a special initiative to commercialize BMD-funded technology at Phillips Laboratory. In November 1993, the Technology Applications program will conduct a special Technology Applications review in Albuquerque. This review will use selected advisors from the BMDO technology transfer review groups who have the best technology and business matches for the selected Phillips projects. This review will assist Phillips technology researchers and managers in their commercialization approach, and potentially put them in touch with the relevant technology managers and entrepreneurs in the U.S. business and industrial base.

In 1992, a total of 53 researchers presented at six TA Reviews.

Technology Application Success Stories: TA Reviews

TA Reviews have been instrumental to the business growth and the formation of new companies. For example, a researcher from the University of Michigan presented information on an ultrafast photodetector, developed under BMD funding at the Ultrafast Science Laboratory. In March 1992, the researcher formed Picotronix, Inc. (Ann Arbor, MI) as a result of feedback at a TA Review. Picotronix already has 2 BMDO SBIRs and is currently setting up manufacturing on the subsystem level. Manufacturing is expected to begin in early 1994. The company has also obtained a \$1.4 million contract with the U.S. Army Tank-Automotive Command (TACOM). This contract applies R&D previously funded by BMDO to research collision avoidance for Army systems.

The fastest photodetector in the world, a BMD-funded technology, has the potential to spin off into a wide range of products including a new class of ultra-sensitive photodetectors for optical communications; optoelectronic-based testing instrumentation; 3-D imaging systems; and medical diagnostics for imaging through turbid or diffuse media (i.e. human tissue or dental material). Research for TACOM has commercialization implications for the automotive industry.

A researcher who presented research on holographic data storage and reconfigurable interconnects at a Materials TA Review. After attending the TA Review, the researcher formed his own company, Optitek, and, based on this BMD-funded technology, is participating in a consortium with major industrial partners on a multimillion dollar R&D contract with ARPA.

BMD Technology Applications Report. The Technology Applications program researches, writes, and publishes a high-visibility annual report on new spinoff technologies and commercial successes, which is sent to requestors, distributed at trade shows, and circulated to a targeted audience. This informative publication includes a description of the technology, photographs and diagrams, and the status of the developer's commercialization progress. The **1992 SDI Technology Applications Report**, which won an award from the Society for Technical Communication, includes 49 spinoff success stories in health; the environment; energy; consumer products; computers; communications; industry; military, security, and aerospace; and scientific research. In 1992, the Technology Applications program received over 900 inquiries for the annual report.

In addition to the annual report, the Technology Applications program also produced and distributes a brochure overviewing program activities for general distribution purposes. This brochure is intended to make U.S. industry aware of the technology transfer services provided by BMDO.

Direct Responses. Engineers and writers of the Technology Applications program respond to many inquiries directly, either via telephone conversation or letters.

Press Coverage. From January 1992 through April 1993, BMDO documented at least 58 technology commercialization articles that appeared in national and local publications. Of the 58 articles, 6 were written by staff working on the program and 52 resulted from press releases and other materials provided to the reporter(s) by Technology Applications staff members.

These articles generated over 200 requests for additional information on the Technology Applications program or specific technologies between January 1, 1993

Conferences and Exhibits. The Technology Applications program participated in five exhibits during calendar year 1992, which included:

- NASA Tech 2002 (Baltimore, MD - December 1992);
- Materials Week '92 (Chicago, IL - November 1992);
- Gearing Up (Detroit, MI - August 1992);
- National Technology Initiative (NTI)(Chicago, IL - September 1992); and
- NTI (Gaithersburg, MD - July 1992).

Two of these conferences, Gearing Up and Materials Week '92, were manufacturing oriented. BMDO's participation in Gearing Up, a traditionally "automotive-only" show, led to mention of the Technology Applications program in a national monthly publication and induced the publication's editor to comment on the "forward thinking" of the program; it also produced invitations to meet with representatives of the research and development staff of the "Big 3" automobile manufacturers.

The other three conferences, NASA Tech 2002 and NTI, were forums for technology transfer. Discussions with attendees generated great interest in the *Update*, and over 400 names were added to the *Update* mailing list as a result of the NASA Tech 2002 conference.

Professional Societies and Trade Associations. Between January 1, 1992 and April 30, 1993, contact was initiated with 47 trade associations and professional societies. From those contacts, 14 articles in member publications were written about the Technology Applications program. In addition, representatives of the Technology Applications program spoke, upon invitation, at six engagements. Over 200 names to the *Update* mailing list were added, and 15 ongoing working relationships with trade associations were established. These associations have had frequent interface with the Technology Applications program and have increased the Program visibility by conducting such activities as publishing Program articles in their newsletters and/or inviting speakers from the Program to present at their meetings. These associations include the following:

- **Air Force Communications and Electronics Association (AFCEA)**
- **Association for Small Research and Engineering Technologies (ASRET)**
- **Association of Technology Business Councils (ATBC)**
- **Institute of Electrical and Electronic Engineers (IEEE)**
- **Industrial Research Institute (IRI)**
- **Information Industry Association (IIA)**
- **Manufacturers Alliance for Productivity and Innovation (MAPI)**
- **National Coalition for Advanced Manufacturing (NACFAM)**
- **National Center for Advanced Technologies (NCAT)**
- **Northern Virginia Technology Council (NVTC)**

Demonstration Projects. BMDO demonstration projects develop and validate models of successful mechanisms to transfer technology from the Federal government to the commercial marketplace in areas such as state economic assistance cooperation, university-based technology transfer, small business strategies to commercialize BMD-funded technologies, and others. Validated concepts are disseminated through reports and brochures. Demonstration programs have included the following:

- ***State Economic Development Program Interface.*** The New Mexico Federal Demonstration Program is developing models for successful technology transfer. Participants include BMDO, the State of New Mexico Economic Development Department, the University of New Mexico School of Business, the Air Force's Phillips Laboratory, Sandia National Laboratories, and Los Alamos National Laboratory. This program is designed to "jump start" the commercial process for BMD-funded technologies through the following mechanisms:
 - Encouraging Federal laboratory developers to create timely commercialization strategies;
 - Using business schools to appraise the commercial potential of new technologies;
 - Working with state and local economic development organizations;
 - Networking each organization's capabilities to commercialize R&D activities.

commercial potential. Based on the results of the study, further action is being taken on the three most commercially viable technologies for developing and implementing commercialization strategies. These technologies include a noninvasive glucose monitor, vacuum dryer, and photocathode manufacturing technique. A final report will be prepared, documenting the model.

- ***Superconducting Magnetic Energy Storage (SMES) Technology Assessment.*** The Technology Applications program has analyzed the potential to commercialize SMES technology. (SMES is a system that stores energy in a magnetic field produced by circulating current in a superconducting coil.) SMES technology has a wide range of applications such as utility load leveling, electrical stabilization, and satellite energy storage. This project resulted in a 57-page technical report, documenting innovations of the SMES program and assessing potential spinoffs from the SMES system. The report also evaluated potential alternative uses for components developed from SMES and identified R&D opportunities that have been created through SMES research. In addition, a 9-page brochure is being produced to increase public awareness of SMES technology.
- ***Civilian Applications of BMD Accelerator Technology.*** In a similar effort to promote commercialization, BMDO is currently preparing a technical report on its contribution to advance state-of-the-art accelerator technology. Cancer radiation therapy, transmutation of nuclear waste, and narcotic and chemical explosive detection represent only a few of the many potential applications for this technology. This report features present and potential payoffs from investments in the accelerator program. It also shows the coupling between the BMD technology and accompanying applications.
- ***Medical Research Technology Transfer.*** A project reviewed medical research findings from the BMD-funded Medical Free-Electron Laser (MFEL) program. FEL technology can potentially be used in numerous medical applications such as blood purification and detection of malignant tumors. Case studies are being written based on the status of the MFEL programs at Massachusetts General Hospital and at other MFEL program locations. The case studies create a technology transfer model which can be used to help commercialize government-sponsored medical research.
- ***Business Trade Show Experiments.*** Because marketing is so important in the commercialization process, the Technology Applications program tested and modeled exhibits BMD-funded technologies with high potential for commercialization. BMD helped a small company exhibit a tandem cascade linear accelerator at a trade show for nuclear medicine. The technology was funded by

products targeted for specific applications. Similar projects may be pursued in the near future.

- **Federal Laboratory Consortium/BMDO Small Business Linkages — BUSINESS GOLD.** BUSINESS GOLD is an on-line database that provides continually updated information about new federally funded technologies with strong spinoff potential. Businesses can use this information to invest in state-of-the-art technologies to give them an edge in manufacturing and selling high-quality, innovative products. Businesses can also use the database as a channel for initiating R&D business agreements such as Cooperative Research and Development Agreements (CRADAs) — a "win/win" prospect for both the Federal laboratories and the participating companies. This effort to move technology from the laboratory to the commercial marketplace strengthens American businesses, and concurrently, the nation's economy and ability to compete in the international marketplace.

BUSINESS GOLD provides information about the following:

- New federally funded technologies;
- Federally funded business and grant opportunities;
- Federal and state-sponsored technical and business assistance services;
- Federal research and technology licensing opportunities.

BMDO, the Federal Laboratory Consortium for Technology Transfer (FLC), and the Department of the Navy were responsible for the initial development of BUSINESS GOLD. The concept is being continued by the National Technology Transfer Center.

INNOVATIVE SCIENCE AND TECHNOLOGY, AND SMALL BUSINESS INNOVATION RESEARCH PROGRAMS

BMDO recognizes the importance of linking rapidly advancing technology with a proactive technology transfer program. BMDO's two innovative technology programs closely interact with the Office of Technology Applications to provide the synergy, management, and insight to rapidly move new technologies into multiple uses. The Innovative Science and Technology (IS&T) research and Small Business Innovation Research (SBIR) programs stimulate an environment where technology offers versatility both within the program and externally. Both IS&T research and SBIR programs require and evaluate commercialization prospects in written proposals.

essential, promising innovations from research to development. R&D is conducted in six general areas: (1) information processing and computer technology; (2) sensing, discrimination, and phenomenology; (3) space power and power conditioning; (4) directed and kinetic energy concepts; (5) materials and structures; and (6) propulsion and propellants. IS&T research awards contracts throughout the public and private sectors for research and development. Over its 9 years, this program has provided \$663 million for BMDO research. IS&T research program has roughly 550 ongoing contracts at any given time, 350 of which are with universities.

The SBIR program funds small businesses to develop far-reaching technology innovations. The program has two phases, with a third outside-funded phase required to actually bring a product to market. In Phase I, researchers are awarded about \$60,000 to explore feasibility. A more extensive second phase, averaging \$500,000 over 2 years, should bring the technology to the laboratory prototype stage. Over its 7 years, BMD's SBIR program has provided \$200 million to 500 firms for 1,300 projects.

laboratories, have experienced extensive success in spinning off their technologies into commercial products. Some of these companies include the following:

- S I Diamond Technology (Houston, TX) developed a process to apply Amorphous Diamond™ films at the University of Texas with funding from IS&T research and SBIR programs. The original BMDO research developed materials for short wavelength lasers. After concluding a licensing agreement with the University of Texas, S I Diamond is now commercially selling these films using their patented room-temperature laser ablation process. These optically transparent diamond coatings can be used in optical lenses, machine tools, flat panel displays, and surgical tools. S I Diamond sold \$5 million in stock in its Initial Public Offering in 1993.
- AccSys Technology, Inc. (Pleasanton, CA) developed the first commercial ion linac for cancer therapy at the Loma Linda Medical Center's proton beam cancer therapy. With sales of roughly \$6 million, AccSys is actively pursuing commercial markets to turn research on linear accelerators (linacs) into mechanisms for cancer therapy, medical imaging, waste treatment, and explosive detection. AccSys is currently collaborating with a medical team at the University of California, San Francisco, and has received an SBIR Phase I grant from the National Cancer Institute for research on the development of a Radio Frequency Quadrupole (RFQ) linac for brain tumor treatment using boron neutron capture therapy. Listed in Inc. Magazine's "Inc. 500" for 1991 and 1992, this rapidly growing firm was featured in the 1992 ABC Business World program for its SBIR program success.
- Funded by the IS&T research as well as the SBIR program, Cree Research, Inc. (Durham, NC) is now the world's leader for blue light emitting diodes (LEDs). Until recently, blue was the one missing color for full-color LED presentation displays. Cree has completed the color spectrum, making full color presentations feasible. Blue LEDs can be used for applications such as ad displays and high definition television (HDTV). Cree currently sells about 10 million units per year and launched an Initial Public Offering in February 1993. The original BMDO funding was for research at North Carolina State University on silicon carbide for radiation-resistant electronics; Cree Research spun off this research to use this silicon carbide process for non-volatile computer memories and blue LEDs.

This technology allows for chlorofluorocarbon-free cooling. Satcon went public in 1992 and has formed a joint venture with Advanced Medical Systems, Inc. for heart pumps. Original BMDO funding was for isolation stages and vibration-free turbines.

- Irvine Sensors Corp. (Costa Mesa, CA) is currently selling 3-dimensional multi-chip modules (3-D MCMs) for high-speed computing and memories. This technology can be used in lap-top computers, image processors, supercomputing, and smart sensors. Three-D MCMs allow more information to be stored in a smaller space with less access time. Irvine Sensors have developed the first commercial "short stack" memory device and has formed a joint venture with IBM to produce "short stack" memories and high-density chip stacking. Irvine originally conducted R&D on this technology through the BMDO SBIR program to develop smart electronic chips for focal-plane array sensors.

The Technology Applications program has also been involved with 21 new businesses that have started as a result of BMD technology research and development. For example, some researchers have attended TA Reviews previous to or after company start up, and some companies have received visibility through the **Technology Applications Report**, or the **BMD Technology Applications Update**. These companies are included in Table 1: Start-up Businesses.

Table 1: Start-up Businesses	
Spinoff Company	Original Developer
Aura Medical Systems, Inc. (El Segundo, CA)	Aura Systems, Inc. (El Segundo, CA)
AccSys Technology, Inc. (Pleasanton, CA)	Los Alamos National Laboratory (Los Alamos, NM)
Micracor, Inc. (Acton, MA)	MIT-Lincoln Laboratory (Cambridge, MA)
Novapure Corporation (Danbury, CT)	Advanced Technology Materials, Inc. (Danbury, CT)
On-Line Technologies, Inc. (East Hartford, CT)	Advanced Fuel Research, Inc. (East Hartford, CT)
Picotronix, Inc. (Ann Arbor, MI)	University of Michigan (Ann Arbor, MI)

Spinoff Company	Original Developer
Nodal Systems Corporation (<i>Huntsville, AL</i>)	University of Alabama at Huntsville
Optitek, Inc. (<i>Stanford, CA</i>)	Stanford University (<i>Stanford, CA</i>)
Applied Pulsed Power, Inc. (<i>Ithaca, NY</i>)	Cornell University (<i>Ithaca, NY</i>)
Superex Polymer, Inc. (<i>Waltham, MA</i>)	Foster Miller, Inc. (<i>Waltham, MA</i>)
Photonex Corporation (<i>Rockville, MD</i>)	Quantex Corporation (<i>Rockville, MD</i>)
Sandia Systems, Inc. (<i>Albuquerque, NM</i>)	University of New Mexico (<i>Albuquerque, NM</i>)
PCAST Equipment Company (<i>Pittsburgh, PA</i>)	Massachusetts Institute of Technology (<i>Cambridge, MA</i>)
Isothermal Systems Research (<i>Kent, WA</i>)	University of Kentucky (<i>Lexington, KY</i>)
Chapman Instruments, Inc. (<i>Rochester, NY</i>)	Photographic Sciences Corporation (<i>Webster, NY</i>)
Advanced Photonix, Inc. (<i>Camarillo, CA</i>)	Xsirius, Inc. (<i>Marina Del Ray, CA</i>)
nCHIP, Inc. (<i>San Jose, CA</i>)	Lawrence Livermore National Laboratory (<i>Livermore, CA</i>)
Accelerator Applications, Inc. (<i>Somerville, MA</i>)	Science Research Laboratory, Inc. (<i>Somerville, MA</i>)
CIENCIA, Inc. (<i>East Hartford, CT</i>)	Scientific Research Associates (<i>Glastonbury, CT</i>)
CLR Photonics, Inc. (<i>Boulder, CO</i>)	Coherent Technologies (<i>Boulder, CO</i>)
Rio Grande Medical Technologies, Inc. (<i>Albuquerque, NM</i>)	Sandia National Laboratory (<i>Albuquerque, NM</i>)

Table 2: CRADAs Resulting from BMDO-Funding

Company	Laboratory
Conductus (<i>Sunnyvale, CA</i>)	Naval Command, Control and Ocean Surveillance Center
AccSys Technology, Inc. (<i>Pleasanton, CA</i>)	Argonne National Laboratory
United Technologies Optical Systems (<i>West Palm Beach, FL</i>)	Oak Ridge National Laboratory
Lockheed Missiles and Space Company, (<i>Palo Alto, CA</i>) OCA Applied Optics (<i>Garden Grove, CA</i>)	Oak Ridge National Laboratory
ST&F Precision Technologies and Tools (<i>Arden, NC</i>)	Oak Ridge National Laboratory
Martin Marietta Missile Systems (<i>Orlando, FL</i>)	Oak Ridge National Laboratory
Contour Fine Tooling, Inc. (<i>Marlborough, NH</i>)	Oak Ridge National Laboratory
Permacharge, Inc. (<i>Albuquerque, NM</i>)	Sandia National Laboratories

Table 3: Companies Conducting BMD-Funded R&D that have Recently Gone Public

- Conductus (Sunnyvale, CA)
- Cree Research (Durham, NC)
- Kopin Corporation (Taunton, MA)
- SI Diamond Technology (Houston, TX)
- SatCon Technologies (Cambridge, MA)
- Superconductor Technologies, Inc. (Santa Barbara, CA)

The transfer of BMD technology has resulted in nearly 100 commercial products or systems, and another 40 that are expected on the market in the next 2 years. The Technology Applications program has been involved with most of these companies through TA Reviews, demonstration programs, or articles mentioning their technologies. Examples of these products are included in Table 4: Examples of Commercial Products.

Table 4: Examples of Commercial Products

Product	Company
Acousto-optic tunable filters for on-line chemical monitoring	Brimrose Corporation of America (Baltimore, MD)
Blue light emitting diodes (LEDs)	Cree Research (Durham, NC)
Diamond window for an X-ray detector using CVD diamond films	Crystallume (Menlo Park, CA)
Microchip lasers	Micracor, Inc. (Acton, MA)
Roto-Lok® rotary drives	Sagebrush Technology (Albuquerque, NM)
Abductory Inductive Mechanism (AIM) software (decision-making and data analysis)	Abtech Corporation (Charlottesville, VA)

Product	Company
Microwave filters with superconducting thin films	Superconductor Technologies, Inc. (<i>Santa Barbara, CA</i>)
MOS-controlled thyristors (a new line of power semiconductors)	Harris Semiconductor (<i>Schenectady, NY</i>)
Plasma-assisted chemical etching process for producing silicon-on-insulator wafers	Hughes Danbury Optical Systems, Inc. (<i>Danbury, CT</i>)
SimTool™ thermal management software	Mainstream Engineering Corp. (<i>Rockledge, FL</i>)
Scatterometers and industrial measurement systems	TMA Technologies, Inc. (<i>Bozeman, MT</i>)

SUMMARY

BMDO has an innovative, pro-active, and results-oriented program to help its researchers and developers apply the results of their findings to as many markets as possible. The Technology Applications program uses a variety of approaches and resources for technology transfer, backed by a resourceful staff who are dedicated to their mission to help transition BMD-funded technologies to multiple applications.